Optimising the development and benefits of **green infrastructure**

Main findings of the Metropolis **City Managers Community 2020**

metropolis

Parc du Mont Royal, Montréal. Photo: Jp Valery on Unsplash

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Foreword

The findings of this report are based on activities carried out with a total of 15 Metropolis members between June and November 2020, in the framework of the activities of the City Managers Community, a project funded by the Metropolitan Area of Barcelona (AMB), which every year brings together a select group of senior public managers who are in charge of day to day operation of major cities and metropolitan areas. A specific methodology was developed by Alexander Heichlinger, external senior expert, which included the conduction of a short survey and of three online events around the theme of green infrastructure, a timely topic due to the need to move from "grey" to more "green" infrastructure.

This report showcases the many ways in which we can establish, develop and expand at a metropolitan scale, the green infrastructure. Due to the Covid-19 pandemic, this issue is more urgent and critical than ever. Being in lockdown and not able to go anywhere but our cities, we understood the need for urban green spaces not only to reclaim our health and well-being, with better air quality and transportation architecture in densely-populated areas, but also to fight against the climate crisis and keep our commitments towards the accomplishment of the Sustainable Development Goals. Several studies show that the residents of greener urban areas have longer life expectancy, fewer mental health problems and better cognitive functioning, among other benefits. Nonetheless, the green infrastructure throughout the metropolis has to be well planned, designed and implemented, for it to be effective and functional, and to tackle inequalities across the metropolitan territory.

With the City Managers Community and all the projects of Metropolis, we hope to continue giving more spaces for the dialogue and exchange of ideas and solutions, on both the premise and promise of the 2030 Agenda and its global goals, seeking participatory and effective metropolitan governance fosters economic development, sustainability, social cohesion, gender equality and quality of life.

Octavi de la Varga
Metropolis Secretary General

Introduction

Urban areas concentrate most of the environmental challenges that the world population is facing today. In addition, due to the Covid-19 outbreak, the need for healthier urban environments, with better air quality and mobility architecture in highly dense populated territories become pressing issues and gain relevance on the geopolitics.

Green infrastructure (GI) is thus of high priority for metropolitan governments, as it is also much needed to provide innovative solutions to problems that single-purpose 'grey' infrastructure does not manage to tackle anymore. In the widest sense, GI has the increased potential to provide strategically planned, smart and integrated solutions resulting in environmental, economic and social benefits by protecting the environment and biodiversity in metropolitan areas. By definition, GI includes a broad scope of initiatives which can be combined, such as green roofs or walls, reed-beds, multi-functional zones or biodiversity rich business parks.

Since challenges and needs vary across boundaries, local authorities play a key role in identifying and developing attractive solutions to environmental, social and economic issues that are fully integrated across different policy domains. Solutions concentrate on aspects such as climate change mitigation and adaptation, efficient spatial planning to restore degraded ecosystems and conserve biodiversity and an optimal use of resources.

In a global context, the Agenda 2030 with its 17 SDGs has paved the way for a greener awareness rising among countries and its cities. Several SDGs make either direct or indirect reference to the necessity to focus and/or invest in green infrastructure for the benefits for all.

A summary of the conclusions of the activities of the Metropolis City Managers Community this year follows.

Preliminary insights: green infrastructure metropolitan portraits

In order to select the group of participants of the City Managers Community in 2020, in early June, a survey named "Green Infrastructure Metropolitan Portrait" was sent to all the 138 Metropolis members to date. This survey contained questions seeking to analyse certain organisational and strategic issues regarding GI, as well as facts & figures and current flagship projects in motion. By its deadline of submissions, on July 6, the survey had been completed by 15 geographically well spread Metropolis members, from Africa (2), Asia- Pacific (3), Europe (4), Latin America and the Caribbean (4) and North America (2).

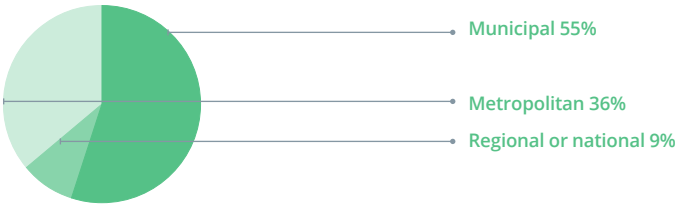
The survey responses showed that all, except one member, had a dedicated department/unit for the development and pursuit of green infrastructure (GI). For the majority of the members the definition of GI in their metropolitan areas deals with ecosystem services and green/natural spaces. In one case, low-carbon production and construction were explicitly mentioned. Only one member also included other concepts such as renewable energy, transport/mobility and recycling /waste management.

Another finding was that 79% of the participating governments have a strategy on GI in their territories and 80% of these members unanimously stated that this strategy is supported by a regulatory framework for its deployment (e.g. green public procurement mechanisms).

Green space per inhabitant of the different responding members varies quite a lot ranging between 1m2 and 102,1 m2 per inhabitant. Its distribution differs and in most cases, green spaces can be found throughout the territory. In some cases, they are mainly located at the periphery.

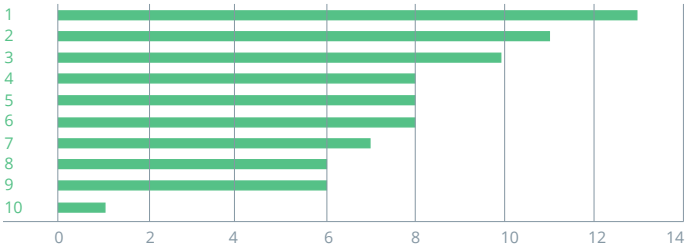
Regarding the governance structure in the design and implementation of GI policies and strategies, the majority of the territories work both local and metropolitan.

Scale of "political" strategy for increasing GI:



Close partnerships with the private sector were mentioned by 14 out of the 15 responding members. These, along with the cooperation with the academia, civil society organisations and also individual citizens (13 out of 15), highlight both the need and the willingness for structured and on-going collaboration among various actors to fully pursue the ambitious goals set in GI development.

Regarding the question "What type of green infrastructure do the Metropolis members have?", the most cited projects cover "fresh air corridors, parks and green spaces, community gardens and sustainable urban drainage systems".



1. Fresh air corridors, parks and green spaces
2. Community gardens
3. Sustainable urban drainage systems
4. Infrastructure that enriches biodiversity in coastal/ river areas
5. Infrastructure that enriques biodiversity on land
6. Urban multi-functional farming, incl. food production
7. Green wall and/or green roof
8. Foodplain forest
9. Biodiversity-rich business park and ecosystems
10. Other

The City Managers Community meets

On July 16, representatives of the Metropolis membership who took part in the Green Infrastructure Metropolitan Portrait survey were invited to join an online session to get to know each other, get acquainted with the overall findings of the survey, and exchange information about their green infrastructure flagship projects. The webinar counted on the participation of "green infrastructure managers" from Barcelona (metropolitan area and municipality), Belo Horizonte, Bogotá, Cairo, Chengdu, Ciudad de México, Greater Manchester, Guadalajara, Madrid, Montréal, Ramallah, Rio de Janeiro, San Salvador, and Tehran. A sneak peek of some of their experiences follow:

Photo: Àrea Metropolitana de Barcelona

In the **Metropolitan Area of Barcelona**, the socio-environmental recovery of the Llobregat River represents a key process in the connectivity of the metropolis. The river crosses 16 municipalities in the metropolitan area and is surrounded by a high density of various infrastructures: highways, trainways, housing, and agricultural lands, just to name a few.

Photo: Food and Agriculture Organization

The **Belo Horizonte** Urban Agroforestry project is planting native trees and native agricultural crops for food security in degraded and socially vulnerable areas which also increases local biodiversity in an altering micro climate.

Photo: Pixabay

In **Cairo**, many projects in the field of reducing loss and detection of water leakage are being implemented, also with the aim to maximise the role of civil society organisations in implementing and financing sanitation projects. Cairo's experience using green infrastructure rationalised the consumption and management of available water resources, reducing the losses of drinking water from 34% in 2014 to 26% in 2019.

Photo: Chengdu Municipal People's Government

The **Chengdu** Municipal People's Government launched in 2017 the Park City Initiative, whose ambition is to make Chengdu into a city of gardens and parks, while building a city within a park. By 2050, Chengdu is expected to be home to the Tianfu Greenway, the world's largest green path network. This "greenway belt" will be linked to hundreds of parks, gardens, wetlands, traditional rural communities (known as Linpan settlements) and protected ecological zones, enveloping Chengdu into one massive garden.

Photo: Pxhere

Madrid is developing its most ambitious nature based solution project, the Metropolitan Forest, which in 2030 is expected to ecologically connect 179 municipalities of the metropolitan area, across a green corridor of 75 km. The Spanish capital is also focussing on mobility management for vulnerable groups, develops an open platform for multimodal mobility information and services, creates an adaptive parking management based on energy efficiency and occupancy, and introduced electric and hybrid buses for public transport, among other initiatives.

Photo: Ville de Montréal

Montréal invests in bioretention systems for flood management and multiple social and environmental benefits: for instance, along Papineau Avenue, the city's longest north-south street, soil beds planted with native vegetation control stormwater runoff, countering the heat island effect and increasing biodiversity. Formerly a car dominant motorway-like avenue, Papineau became a green boulevard with massive greening at the sides and centre. Such corridors allow the creation of pedestrian pathways, which ensure, in addition, human-scale and healthy access to the neighbourhoods that are crossed by the avenue. Moreover, the city concentrates a series of different green infrastructure initiatives, such as "Le Grand parc de l'Ouest", which is the biggest municipal park initiative in Canada, and plans to expand its network of green corridors.

Photo: Ramallah Municipality

The Green **Ramallah** Project aims to bring the city towards sustainable urban development that complies with the city's Resilience Strategy 2050. The project has developed an emergency network with key stakeholders to deal with the many consequences of climate change.

Photo: Prefeitura da Cidade de Rio do Janeiro

The **Rio de Janeiro** municipality initiated more than 30 years ago the programme Mutirão Reflorestamento, which is based on a community task force for the reforestation of the city. So far, more than 3400 hectares of green areas have been recovered, with 10 million seedlings planted. Nowadays consolidated as regional policy, not only does the programme help to control the expansion of informal settlements, prevent landslides and increase local biodiversity but also it provides direct income to over 600 people from vulnerable communities.

Photo: Nature Bridge Parks Tehran. Wikimedia Commons

In **Tehran**, energy management systems, especially based on solar energy, are being built to multiply benefit from its impact.

Photo: Greater Manchester Combined Authority

The IGNITION project aims to develop innovative financing solutions for investment in **Greater Manchester**'s natural environment. Having started in 2019, by 2038 the project shall enable an increase in Greater Manchester's urban green infrastructure coverage by 10% from a 2018 baseline, in order to build resilience to climate change in the city-region.

Tackling common challenges

The knowledge and experiences shared by Metropolis members during the initial activities of the City Managers Community were crucial to identify **three main common challenges** that served to structure the programme, contents, and dynamics of the 5th City Managers Days, on 17 and 18 November 2020: dealing with **existing infrastructures** of different types, tackling and adapting to **climate change**, and improving **metropolitan governance**.

Due to the pandemic, this was the first time that the City Managers Days were held fully online. Despite the absence of a field activity, which had been organised in previous editions, the event still allowed members to showcase some of their flagship projects to a wider audience, during a session open to the general public, and also to exchange their solutions to the three challenges in a tailor-made workshop. Below are the responses that some of the participants shared as solutions during the workshop that took place on November 18.

Challenge 1

How to implement green infrastructure in areas with a high density of infrastructure and mobility pressures?

The example of the Llobregat river, presented by and located in the Metropolitan Area of Barcelona, started the debate on this first challenge. This river, which is a key element of the green infrastructure, holds high biodiversity values and is crucial for ecological connectivity. The river and its tributaries are essential for ecological connectivity, as long as they connect the metropolitan coastline with the hinterland and its mountains. Yet its permeability is smaller than desired due to the numerous urbanised areas all around. For decades, the river was a forgotten part of the territory, but today it has recovered its qualities for people's enjoyment and wellbeing. It is now connected to the other natural spaces, such as metropolitan parks, mountain ranges and metropolitan beaches, for a net of green parks and routes structuring the territory and the municipalities. In spite of being intensely humanized, filled with communication infrastructures, industries and dense urban areas, the final stretch of the Llobregat river, which runs across 16 municipalities, is a 30 km long ecological infrastructure, vital for the provision of ecosystem services.

Guy Trudel, Planning Advisor of the City of **Montréal**, joined the conversation, describing how the population and government in Montréal shifted from being critical towards the Papineau Avenue project to being increasingly in favour of green infrastructure and even demanding more such projects, mostly because the benefits and consequences are increasingly visible. Montréal is now working with a GI plan with a concretely assigned budget for more projects. The available space remains a challenge, as it is reduced for cars, but more space is created from citizens, bikes and trees. Moreover, involving experts, the co-ownership of citizens and politicians, and succeeding in creating the demand for more, are noteworthy key points of this practice.

Liu Suman, Deputy Division Chief of the Foreign Affairs Office of **Chengdu** Municipal People's Government shared the current challenges of Chengdu's Park City initiative, one of the city's flagship projects for the next three decades. One of them is greening the center because of its high density and existing building stock, which is difficult to change from "grey" to "green". To tackle this challenge, Chengdu is, firstly, making existing GI more accessible by opening private areas from hotels or companies, for example, to the public. Secondly, the city is creating green spaces in crowded areas through mini gardens and pocket parks in street corners, or in front of houses, which are looked after by citizens themselves. Citizens' mindset of bringing nature closer to their homes and communities is helpful in this regard. Where previous infrastructure cannot be changed, it can still be made greener (e.g. like green fly-overs, greening of bridges, buildings, etc.). Success factors of this case are citizens' supportive mindset, available financing for citizen initiatives (e.g. for pocket parks) and the very high level of citizen engagement. In this concrete case, workshops about appreciating nature and planting trees led to more people adopting sustainable behaviour and increasing cycling.

Key lessons:

- Having a good plan from the beginning, showing that GI can improve existing infrastructure
- Explaining the benefit of GI to citizens and politicians
- Public administration's capacity to shift paradigm through educational activities

Challenge 2

How to integrate the perspective of climate change adaptation in the planning and design of green infrastructure projects? How to take climate change scenarios into account for defining natural conservation and restoration strategies?

In the Metropolitan Area of Barcelona (AMB), this challenge entails considering a series of climate scenarios, such as the increase of world temperature, the decrease of resources or the loss of biodiversity. The Metropolitan Area is already working to face these challenges and to boost the resilience of the metropolis. "The green infrastructure will certainly help to reduce the impact of climate change, as it is a tool to make the territory more versatile towards the forthcoming reality", said Antoni Farrero, General Coordinator of the Technical Office of Management of the AMB.

Frederic Ximeno, Environment and Urban Manager at the **Barcelona** City Council, one of the 36 municipalities that make up the AMB, highlighted that for successful climate change mitigation policies, up-to-date knowledge, cooperation across governmental layers (City of Barcelona, Metropolitan Area, Region of Catalonia) and participation in EU-funded projects was crucial. Barcelona applied a dynamic planning model, which leaves room for opportunities. This was considered important as sometimes new spaces appear because of a change of function of public buildings or parks. This was recently the case of a prison located in Barcelona, which was given up, and consists in new space available for the city government that could be integrated in its urban planning processes.

He underlined citizen participation and communication as paramount. In Barcelona, GI has entered the main communication campaigns of the city and is treated transversally, and no longer just a niche. Under the umbrella programme Mans al Verd, horts i jardins comunitaris, Barcelona runs various citizen activities in relation to biodiversity, like competitions of green walls. There are further projects on biodiversity and open data, including extensive GIS observatories and biodiversity observatories. Additionally, the city changed its management style towards a more ecological perspective and re-naturalisation.

Rachel Morrison, Nature Based Solutions Advisor at the **Greater Manchester** Combined Authority, presented key approaches and findings from the IGNITION project, which is a science-driven research project that aims to establish innovative nature-based solutions financing and delivery to increase urban green infrastructure coverage in Greater Manchester, with the objective to build resilience to climate change in the city-region.

At first, a climate change risk assessment was carried out, identifying the risks to which Greater Manchester is vulnerable, such as strong rainfalls and flooding, temperature rise and heat waves. Based on this analysis, the authority decided to invest in strategically located infrastructure (money specifically targeted at concrete solutions) and to adopt an approach based on scientific modelling, which gave indications to combat climate change through greening the city-region, and to set a clear goal: by increasing GI by 10%, temperature rises would be maintained around the level of the year 2000.

To reach this goal, Greater Manchester works across four strands: mapping opportunities on a database which is accessible to the public, progressing its investment strategy through the Greater Manchester Environmental Fund, developing business plans, and strengthening partnerships focussed on delivery. In this respect, a 5-year environment plan and targets were developed in partnership with NGOs, housing developers, climate agencies, the airport, and other stakeholders. As in other practices, well-targeted communication and education activities and campaigns were pointed out as paramount.

Key lessons:

- Greening must be functional and easily accessible to the population
- Communication and citizen participation are a must for successful GI policies
- A good definition for GI is one that can easily be conveyed to politicians and citizens
- GI has to be implemented in conjunction with other policies, such as health or mobility
- Applying science-based and collaborative approaches along with the development of flagship projects provides clear evidence and benefits of GI for climate resilience.

Challenge 3

How to foster and coordinate different levels of government and stakeholders in green infrastructure?

Emilio Martínez Vidal, Senior Advisor of the Strategic Planning Directorate of the **Madrid** Municipality, explained how the flagship project of the Madrid Metropolitan Forest is steered by a transversal technical committee composed of staff from the environmental, cultural, taxation and mobility departments, to name a few, who meet once a week, and also seeks cooperation with the national government of Spain. The project is further divided into five sectors, in which sub-projects can be presented by any stakeholder - so far, 25 presentations have been submitted, in the fields of citizen participation and public-private cooperation. Another key aspect of this flagship project is to secure funding, which has been made possible through a combination of sources, such as a grant from the European Union, public-private partnerships, and direct sponsorship from businesses and institutions.

Ingrid Alfaro, Head of the Environmental Unit of the **San Salvador** Metropolitan Area, highlighted the benefits of being a legally established metropolitan body with clearly set competences. Every two weeks, the 14 mayors of the metropolitan municipalities meet to exchange ideas and policies. In addition, there are various commissions for concrete themes, which serve as fora for the development of policies and practices. Citizen involvement for the planning and execution of new initiatives is equally significant, albeit it can come with challenges of reconciling different options.

Maritza Hernández, Green Infrastructure Director of **Mexico City**, explained the challenging metropolitan reality of the Mexican capital, with its more than nine million inhabitants, 16 municipalities and an area of approx. 1.480.000 sqm, divided into eight distinct climate regions and zones. Relevant national ministries (e.g infrastructure, water, secretaries of tourism, education, etc.) and all sixteen municipalities are included in the GI planning processes naming challenges and natural risks and for working on the project portfolios of the eight regions. Apart from the different levels of government, the current GI plan was developed collaboratively with academia and companies. Five main project lines were developed: ecosystem services, sanitation, cycling infrastructure, conservation areas, and accessibility and involvement of citizens. More than ten million trees were planted to better connect green spaces and create spaces for migratory birds. Extensive work has been carried out regarding citizen communication and the engagement with diverse citizen representative groups. This project succeeded in changing the usual paradigm of departmental thinking by involving all actors of society across all areas and topics (citizens, academic and companies) and demonstrating the transversality of GI.

The experiences of Madrid, San Salvador and Mexico City correspond with the message conveyed by the Metropolitan Area of Barcelona: "The whole is always greater than the sum of its parts, so it's not about creating or designing or managing isolated spaces, but rather about working on the whole. We don't strive for excellence in every part, instead, we strive for a satisfactory result of the whole", concluded Antoni Farrero, highlighting the importance of maintaining functional processes between the 36 municipalities in the metropolitan area, which allow the evolution towards structures with connectivity and clear functions.

Key lessons:

- Aligning politicians across all parties with public administrative official
- Working across various layers of government
- Identifying supporters in government to shape and create initiatives
- Engaging citizens through offline and online means
- Collaboration between private companies, government and academia is crucial
- Constant evaluation and regular meetings with metropolitan mayors to improve their approach to greening

A continued learning process

Green infrastructure arises as a great source of innovative solutions to tackle many of the challenges that our urban societies are facing today. From better air and water quality to the control of diseases, green infrastructure has the potential to provide integrated solutions resulting in environmental, economic and social benefits. Its strategies and approaches may include a broad scope of initiatives, such as green roofs or walls, reed-beds, urban gardens and forests, ecological corridors and others, which can be implemented in combination with zoning, mobility, housing and civic engagement plans, in order to obtain optimal results. At metropolitan scales, green infrastructure can reach the magnitude required to respond to climate change emergencies and to improve the quality of life of vast urban populations.

The experiences shared by Metropolis members during the activities of the City Managers Community in 2020 serve as strong role models and best practices in creating healthier and happier places for people to grow, live and work. However, GI solutions are continuously sensitive to local needs and priorities and, thus, dependent on the engagement and innovation capacities of local leaders. So, GI may also lead to adverse scenarios, such as the displacement of communities, as well as changes in land prices and housing costs. A growing number of researchers on environmental justice stress that the lack of effective planning policies, combined with large areas of both informal land tenure and illegal development – especially in the global south – can lead to green spaces and environmental amenities becoming a luxury, predominantly only accessible by wealthier groups, in a process so far called “green gentrification”, which is being further discussed in the 12th edition of the Metropolis Observatory collection of issue papers, to be released in January 2021.

It is clear that the subject of green infrastructure is not exhaustive and has an infinity of aspects to be addressed, especially at metropolitan scales. Within the framework of the new Metropolis Strategic Action Plan, other projects of Metropolis will give continuity to this debate and learning experiences, from 2021 to 2023. GI initiatives will be further promoted and exchanged, for instance, at the USE platform, through the new cycle of Metropolis Projects, and special publications, providing new opportunities for the Metropolis members to continuously learn from each other.

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Metropolis members that engaged in the City Managers Community in 2020:

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6. Cairo / Egypt's Ministry of Housing, Utilities and Urban Communities
7. Chengdu Municipal People's Government
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Secretariat General
Avinyó, 15. 08002 Barcelona (Spain)
Tel. +34 93 342 94 60
metropolis@metropolis.org
metropolis.org

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metropolis

Parc del Riu, Àrea Metropolitana de Barcelona.
Photo: María José Reyes

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